BIOTERRORISM BY FOOD POISONING

Subject: Science | **Current:** 2009 | **Grade:** 9-12 **Day:** 1 of 1

1 Purpose

To give the students an appreciation of how biological terrorism can occur in the United States, and how both emergency medical and law enforcement agencies can respond to a bioterror attack.

2 Duration

50 minutes

3 Additional Topics

Law enforcement

4 Objectives

Students should be able to:

- Access websites from both government and NGO sources to obtain, integrate and apply technical information about bioterrorism and our response to it.
- Appreciate the role of law enforcement in handling an incident of bioterrorism.
- Understand the necessary precautions for preventing the release of a possible biological agent from a site.

5 Vocabulary

Students should become familiar with these terms:

- **HVAC**: heating, ventilation, air conditioning system. The primary air-moving system within modern structures.
- **Triage**: prioritization of victims so that those most in need of immediate removal to the hospital are identified.

6 Materials

Students will need the following materials:

- Computer with internet access
- Bioterrorism lecture
- Bioterrorism activity sheet

7 Additional Resources

The following resources are used in the lesson:

- **U.S. CDC Website for Bioterrorism:**
  http://www.bt.cdc.gov/bioterrorism/
- **NTI Bioterrorism tutorial:**
  http://www.nti.org/h_learnmore/bwtutorial/index.html
- **PAHO:**
  www.paho.org/English/HCP/HCT/EER/bioterror.htm
- **WHO site:**
  http://www.who.int/topics/bioterrorism/en/

8 Procedures & Methods

BIOTERRORISM BY FOOD POISONING

Preface

In this exercise, the students will be provided with a hypothetical situation in which a commercial food preparation establishment is experiencing deliberate food contamination combined with a violent act. Student groups are to compile information about the disease agent, handle victims, and handle the perpetrator of the incident. Both public health and law enforcement issues are emphasized.

All necessary information can be obtained from the websites listed above.

A. Introduction

Bioterrorism is the deliberate release of viruses, bacteria, or other agents used to cause illness or death. These agents are typically found in nature, but it is possible that they could be modified to increase their ability to cause disease, make them resistant to current medicines, or increase their ability to be disseminated. Biological agents can be spread through the air, through water, or in food. Terrorists may use biological agents because they can be extremely difficult to detect and do not cause illness for several hours to several days. Some bioterrorism agents, like the smallpox virus, can be spread from person to person and some, like anthrax, cannot.

Biological warfare has been known (and applied to great effect) for millennia. In recent years, however, with enhanced knowledge of microbiology, culturing techniques and means of dissemination, the threat has become more acute. Terrorist use of bioweapons has occurred and several nations are known to be manufacturing tactical biological weapons. Therefore, awareness of this potential threat by first responders, medical care providers, public health agencies, elected officials and ultimately the general public, including how to identify and respond appropriately, is essential.

Terrorists also have disseminated biological agents by contaminating food. Typically, only uncooked or improperly stored food is vulnerable; heat generated during cooking will destroy most pathogens and toxins. A terrorist would probably need to target foods that are commonly eaten uncooked or that can be contaminated after being cooked.

B. Developments

On the first day, the instructor will review the introduction and the background of the problem, as well as the impacts of bioterrorism. While doing so, the class will take notes. They will also discuss how bioterrorism can impact the health of their community and the larger region (e.g., state, Midwest U.S.), should an attack ever occur.

C. Practice

On the second day, review the material on bioterrorism from the previous day. The class will then brainstorm recommendations for preventing bioterrorism. The teacher will add recommendations that were not included on the student list.

D. Independent Practice

The students will complete the bioterrorism activity.

E. Accommodations (Differentiated Instruction)

The teacher should circulate among the individual groups to be sure students are completing the activity as directed. The teacher may need to answer individual questions at this time. Each member of the student group should have a specific task (recorder, task master, fact checker, etc.) to help the group accomplish its goals.

F. Checking for Understanding

The bioterrorism activity will be turned in and graded. Rubric is provided below.

G. Closure

Careers in this area include:

Food Scientist:
http://www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_1OB?navtype=MA&navid=CAREERS

Microbiologist:
http://www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_1OB?navtype=MA&navid=CAREERS

Related websites:

U.S. Department of Agriculture:
www.usda.gov

U.S. Food and Drug Administration:
www.fda.gov

U.S. Immigration and Customs Enforcement:
www.ice.gov

9 Evaluation

Assess student work using the rubric provided.

10 Teacher Reflection

The teacher will add a reflection upon completion of the unit.

11 Resources & Media

The following resources are used in the lesson:

- **U.S. Centers for Disease Control and Prevention:**
  http://www.bt.cdc.gov/bioterrorism/
- **National Institutes of Health:**
  http://www.nlm.nih.gov/medlineplus/biodefenseandbioterrorism.html
- http://www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_1OB?navtype=MA&navid=CAREER
- **U.S. CDC Website for Bioterrorism:**
  http://www.bt.cdc.gov/bioterrorism/
- **NTI Bioterrorism tutorial:**
  http://www.nti.org/h_learnmore/bwtutorial/index.html
- **PAHO:**
  http://www.paho.org/English/HCP/HCT/EER/bioterror.htm
- **WHO site:**
  http://www.who.int/topics/bioterrorism/en/
- **U.S. Department of Agriculture:**
  www.usda.gov
- **U.S. Food and Drug Administration:**
  www.fda.gov
- **U.S. Immigration and Customs Enforcement:**
  www.ice.gov

LECTURE

Bioterrorism

Biological warfare has been known and applied to great effect for millennia. In recent years, however, with enhanced knowledge of microbiology, culturing techniques and means of dissemination, the threat has become more acute.

Terrorist use of bioweapons has occurred and several nations are known to be manufacturing tactical biological weapons. Therefore, awareness of this potential threat by first responders, medical care providers, public health agencies, elected officials and ultimately the general public, including how to identify such weapons and to respond appropriately, is essential.

A. Categories of Bioterrorism Agents

Given the events of the past two decades, it is essential that the U.S. public health system and primary healthcare providers be prepared to address a wide range of biological agents, including pathogens that rarely occur in the United States.

Even before the bioterror attacks of 2001, in which anthrax spores were deliberately released in the U.S. public mail system, public health officials were concerned about the potential for such an event. In 1999 the U.S. Centers for Disease Control and Prevention (CDC), one of the key components of the Department of Health and Human Services, devised a classification scheme for major biological agents that terrorists could use to harm civilians (see table).

The CDC bioterror lists include those biological agents that pose the greatest threats to national security due to their ease of transmission, high rate of death or serious illness, potential for causing public panic, and special public health measures an epidemic would require.

Since the creation of the CDC lists, public health officials and researchers have been planning and preparing intensively for a possible bioterror attack. Following the 2001 anthrax attacks, federal funding for these efforts increased dramatically.

Categories of CDC biological agents.

Category A Diseases/Agents

High-priority agents include organisms that pose a risk to national security because they –

- can be easily disseminated or transmitted from person to person;
- result in high mortality rates and have the potential for major public health impact;
- might cause public panic and social disruption; and
- require special action for public health preparedness.

Category B Diseases/Agents

Second highest priority agents include those that –

- are moderately easy to disseminate;
- result in moderate morbidity rates and low mortality rates
- require specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance.

Category C Diseases/Agents

Third highest priority agents include emerging pathogens that could be engineered for –

- mass dissemination in the future because of availability;
- ease of production and dissemination; and
- potential high morbidity and mortality rates and major health impact.

B. Bacterial Diseases

Bacteria are one-celled organisms that can survive in a wide variety of environments. Among bacteria, the majority are either beneficial or do no particular harm to other organisms. Only a few are pathogenic, or disease-causing in animals and humans. Because of the differences in biochemical processes between bacteria and their hosts, it is possible to treat most bacterial diseases by using antibiotics.

Some bacteria are fatal if inhaled (for example, the causative agent of anthrax, Bacillus anthracis). Others, however, will make victims feel ill for several days (Shigella, E. coli).

ACTIVITY

Biological Terrorism by Food Poisoning

A. Timeline of Events

9:45 am

Andy's Catering is a private business which receives bulk meat, vegetable and fruit shipments, processes them, and prepares meals for several food establishments at two hospitals, the Indianapolis Airport, and other commercial establishments in the city. The company employs 27 individuals on two different shifts.

A 911 operator receives a call from the company, that one of the employees was caught placing something into the chopped vegetables. When he was confronted about his actions, he became violent and started fighting with her. Other workers jumped on him and are presently holding him down. However, he and one of the men who fought him are bleeding heavily.

10:02 am

Two police officers arrive. The suspect is being held in a room where fruits and vegetables are prepared before being brought into the meal packaging room. This room, adjacent to the kitchen, measures about 30 x 50 feet; in it are several long tables on which food items are set out in large covered dishes. In one corner is the suspect, struggling against two other employees who are forcibly restraining him. Lying a short distance away is another man, seriously injured; an employee is kneeling beside him applying pressure with towels to the man's abdomen. Other employees are standing nearby. Much blood is on the floor.

The officers restrain the suspect, who has several cuts on his hands but is not seriously injured. He is belligerent, however, and refuses to speak to anyone. The other injured man is Mr. Shemp Howard, an assistant manager of the facility. In the struggle to subdue the suspect, he was slashed with a knife. He is bleeding heavily from an abdominal wound and is barely conscious.

On questioning the shift supervisor, Ann A. Conda (who made the 911 call), the officers learn that the suspect was seen pouring a clear liquid from a small bottle into the fruits and vegetables being prepared for the day's meals which were to be sent to the airport restaurants. When Ms. Conda confronted him, the man pulled out a second bottle from his pocket and broke it on the floor, yelling "You're all gonna get it now!" and ran toward the door. Mr. Howard tackled the suspect, and they struggled, landing on the floor. During the fight, the suspect grabbed a kitchen knife and slashed Mr. Howard in the abdomen. Two other employees managed to overpower the suspect and are still holding him when the officers arrive.

A mixture of blood, an unknown liquid, and broken glass cover several square feet of floor. Some people (the suspect and the three men who restrained him, at a minimum) have contacted the liquid with their bare skin. Their clothing has been contaminated. Wet footprints around the room indicate that many more people have stepped in and spread the liquid. There is no noticeable odor to the liquid.

Relevant Concerns

- Two people are injured, one seriously
- One victim may have a life-threatening injury
- Potentially harmful liquid is on the floor
- A threat of additional injury was made
- Two police officers and eight other people are possibly contaminated with an unknown substance

10:40 am

Other responders, including staff of the Indiana Department of Homeland Security, are en route to the scene. Some are beginning to arrive and are being briefed by the first-arriving officers.

10:45 am

The HazMat and evidence teams arrive on the scene.

One day later, 11:00 am

Two male cafeteria employees are experiencing the following symptoms:

- stomach cramping
- A threat of additional injury was made
- fatigue, listlessness

One female has the following symptoms:

- Headache, double vision, inability to swallow, difficulty speaking
- She has signs of moderate paralysis around the facial muscles

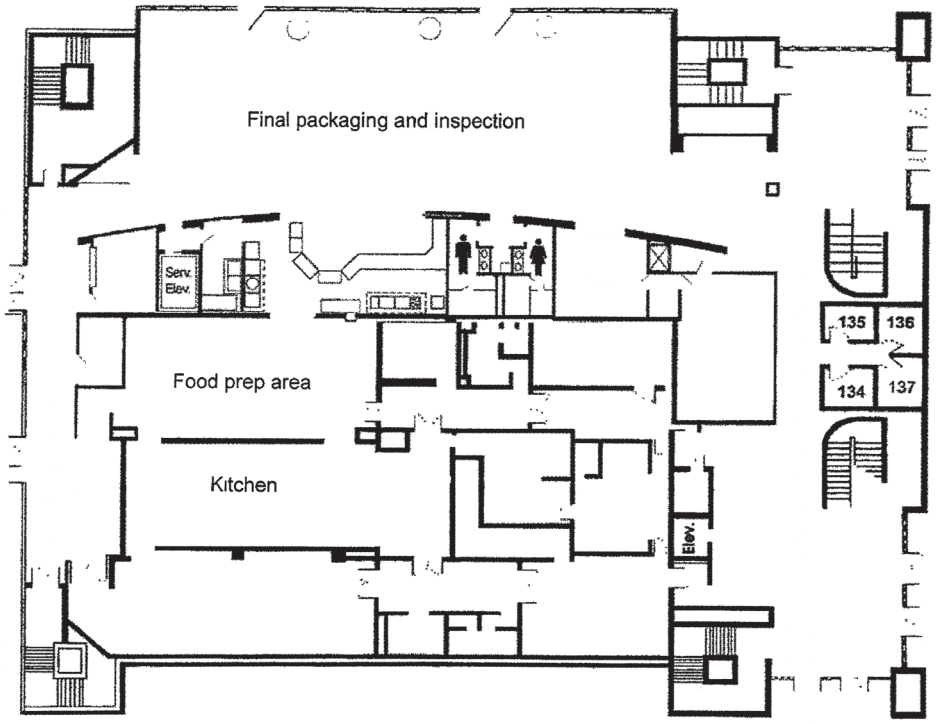
All have been admitted to the Los Arms Hospital downtown. The two male employees admitted that they sampled the pasta salad some time during the preparation of the meal. The female employee stepped in the liquid during the fight yesterday. She may have also been scratched by a piece of broken glass at the scene.

B. Some questions for students

1. What are the primary and secondary considerations of the first arriving officers on the scene? How should these concerns be addressed?
2. What should the officers communicate to their dispatch center and to the civilians on the scene?
3. Should the officers request any other responders to the scene? If so, who, and what should they be told?
4. What reasonable assumptions can the officers make about the unknown liquid?
5. Should anything be done about the HVAC system and the kitchen exhaust?
6. Should any other responders enter the room with the victim? If so, who and why? If they enter the room, what protection do they require?
7. If is not possible to reach Mr. Howard without stepping in the unknown liquid. Should responders do this?
8. Mr. Howard's wound may have been contaminated by the unknown liquid. Does this affect anyone's actions?
9. Are any modifications to routine patient care and transport procedures required to safely treat Mr. Howard and to safely transport him to the hospital?
10. What should the sample collection team do? Is there anything other than the liquid on the floor that should be collected? Who transports the samples, and to which laboratory?
11. Review the floor plan of the Food Prep Room. Where would you set up an area to interview the witnesses? To triage the victims? To decontaminate victims?
12. Do receiving hospital personnel need to modify their usual patient reception and patient care procedures for Mr. Howard. What modifications, if any, may be needed?

C. Resolution

After personnel have been evacuated and processed in the secondary decontamination area (preferably the employees' locker or change room—for a hot shower) the contaminated area is the primary concern. The two choices are to either decontaminate or secure the site, awaiting laboratory results (which may take several days).



D. Comments

Though the identity of the substance is not important here, the liquid contains a toxin derived from the bacterium Staphylococcus aureus. Ingested, it causes nausea and vomiting; anyone consuming the macaroni salad would probably be very miserable for a day or so, but no deaths would be expected to occur.

RUBRIC FOR ASSESSING LEARNING OUTCOMES

Activity in Bioterrorism

In reference to this course, the student demonstrates….

Learning Outcome	Unsatisfactory (0-2) Evidence that the student has mastered this objective is not provided, unconvincing, or very incomplete	Marginal (3-4) Evidence that the student has mastered this objective is weak or incomplete. Isolated facts are provided but not effectively integrated.	Satisfactory (5-6) Evidence shows that the student has generally attained this objective. All major elements are incorporated.	Accomplished (7-8) Evidence indicates that the student has a solid mastery of this outcome.	Exemplary (9-10) Evidence demonstrates that the student has mastered this objective at a high level
Effective use of critical thinking skills					
Understanding of systems thinking and its application					
Proficiency in working collaboratively with others					

Total Points Earned: _____